Monitoring Dissolved Metals in the Ohio River Using Clean Sampling Techniques

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Biographical Sketch of Authors

Kim Mays is employed as an Environmental Engineer with the Ohio River Valley Water Sanitation Commission (ORSANCO). Kim earned a Bachelor's degree in Chemical Engineering from the University of Cincinnati and her EIT certification in 1996. Kim's primary duties at ORSANCO include wet weather projects in two cities and performing dissolved metals sampling. Peter Tennant is employed as the Deputy Executive Director with ORSANCO. Peter manages and implements technical programs.

Abstract

For many years, the Ohio River Valley Water Sanitation Commission (ORSANCO) has been faced with conflicting information regarding aquatic life use support in the Ohio River. While results of fish and macroinvertebrate studies indicated healthy populations, monitoring data for metals indicated impairment. Concentrations of total recoverable cadmium, copper, lead, and zinc exceeded both acute and chronic aquatic life criteria at locations throughout the length of the river. Total recoverable metals violations have historically resulted in Ohio River aquatic life use impairments.

It was believed that the metals were primarily in the particulate form, and therefore less toxic to aquatic life. In October, 2000, the Commission adopted dissolved metals criteria. Prior to that adoption, a dissolved metals monitoring program was initiated. Objectives of the program were to initiate a database of Ohio River dissolved metals data, to demonstrate a sampling technique for dissolved metals that could be utilized by the Commission and its member states, and to establish relationships between dissolved and total recoverable metals.

Recent findings, that widely accepted field sampling methods and laboratory techniques are responsible for significant contamination of historical data, have prompted the development of "clean techniques" for both sample collection and analysis. Grab samples are collected using a modified Virginia Division of Environmental Quality technique and analyzed by 1600 series low-level metals analyses through the Virginia State laboratory. Virginia's sample collection method was originally developed for two samplers, one with "clean hands" and one with "dirty hands." ORSANCO has evaluated the use of the method by a single sampler, since this is more typical of state agency practice.

Results from three years of the clean metals program indicate that not only do dissolved metals concentrations meet in stream criteria, but so do total recoverable metals when collected through clean techniques.